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USSR Report

TRANSPORTATION

No. 86

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USSR REPORT

TRANSPORTATION

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AIR TRAFFIC CONTROL

Moscow GRAZHDANSKAYA AVIATSIYA in Russian No 5 May 82 p 18

[Article by A. Ulanov, chief of the Central Administration for the Operation of Radio Engineering Equipment and Communication: "For Reliability and Economy"]

[Text] The progressing growth of the intensity of the movement of aircraft requires the constant perfection of the ground means of flight control and communication, navigation and landing. This leads to the steady growth of the fixed capital of the ERTOS [Operation of Radio Engineering Equipment and Communications] service. During the past five-year-plan, it increased by 40 percent and, as calculations show, by the year 2000 it will increase again by a factor of 2.5. Expenditures for technical operation are also growing. All of this signifies that, if no measures are taken to reduce them (without a deterioration of the quality indicators of the radio engineering protection of flights), an increase in personnel becomes inevitably necessary.

One of the foremost problems of operation arises--how to satisfy all the growing requirements for the safety and regularity of flights without increasing the number of personnel and lowering operating expenses? In the solution of this task, two basic directions are being pursued. The first consists in the strict calculation of the peculiarities and perspectives of development of each of the regions of the air transportation system of the country and in a selection of the structure of radio means which are economically justified in connection with this. The second direction is the search for more rational methods of the technical service and repair of equipment. Evidently, precisely this is basic for the service.

The perfection of radio engineering means and methods of their operation in one or another form has always gone on. And now additional difficulties have been created because of the great heterogeneity of the equipment park. Along with the most modern automized systems of flight control, secondary radio location, centers of automatic commutation of information, quasi-electronic air technical service, communications equipment executed in microcircuits, equipment developed during the 1950's and 1960's must be operated. Such as the landing means SP-50M and SP-68, the wireless stations APR-7, APR-8 and others. In such conditions it is exceedingly complicated to create any kind of common, centralized system of control and direction by ground means--and that is one of the ways promising a reduction in expenditures in their operation.

Along with this problem, the heterogeneity of equipment gives rise to other difficulties as well. Thus, the search for more perfect forms of the organization of its technical service and repair is impeded. Nevertheless, thanks to the efforts of scientific and production collectives certain successes have been achieved in this matter. In particular, a number of projects have been transferred to technical service with periodic control. This form may be regarded as the first step towards service of technical equipment in accordance with its actual condition. But even it yielded an appreciable effect: Annual operating expenditures decreased by approximately 7 percent. Another important measure became the transition from the traditional operative daily service to one to be realized with greater periodicity (with the preservation of daily control of the work capacity). This yielded an annual economic effect of about 2 million rubles.

Thereby the efficiency of technical service was increased as a method of supporting the work capacity of the equipment at the attained level, and this in turn led to the increase in the realiability and durability of the ground means for securing flights. It is characteristic that the growth rates for reliability on the average exceeded the increases in expenditures for operation. Today the operating time for failure for the majority of facilities exceeded the magnitude established by technical conditions. The prolongation of the resources at a number of projects made it possible to obtain an annual economic effect of about 7½ million rubles. The stabilization of the strength of the ERTOS service has been a no less important result --its growth during the past few years has not exceeded 3 percent.

For the further increase of the efficiency of the work of the service it is necessary to create the prerequisites for the accelerated growth of the technical-economic indicators of operation on the basis of the use of scientific-technical achievements. Let us dwell briefly on these prerequisites.

One of the most important demands made of modern equipment is the presence of built-in means of automized control providing for diagnosis of the technical condition with small expenditures. This will make possible the creation of centralized systems of control and guidance of the technical condition of aircraft. A consequence will be the transition from the traditional daily duty to traffic control. Besides the freeing of a part of the personnel, such a measure provides the possibility of introducing the brigade method of work. Subsequently by virtue of the broad utilization of computer technology there will appear the possibility of the prognosis of the technical condition of equipment, which will make it possible to reduce the volume of preventive service.

Among the methods of technical service a special place is held by the in-flight verification of ground equipment--a labor-intensive and costly operation which on the average consumes about 5 percent of the operating expenses. The perfection of programs and the more precise definition of the periodicity of such check-ups have already now made it possible to save quite a lot of aviation fuel and to obtain an annual economic effect of more than 2 million rubles. In the future, evidently, by virtue of the expansion of the forms of ground control, we will manage to reduce the volume of experimental flights significantly and in some cases limit ourselves to check-ups carried out at the time of ordinary flights.

The perfection of technical service and repair of ground radio engineering equipment and communication facilities requires the fundamental reorganization of the system of the collection and processing of statistical data on the reliability of equipment now in force. Through the joint efforts of scientists of the RKII GA [Riga Krasnoznamennyy Institute for Civil Aviation Engineers imeni Leninskiy Komsomol], the TsNII ASU GA [Central Scientific Research Institute for Automatic Control System for Civil Aviation], the NETs AUVD [Automated Air Traffic Control] and the operators, work is now being done on the creation of an automated system for the collection and processing of information. With its further modification, it can also take upon itself the assessment of the technical and economic indicators of the work of the ERTOS bases--which will make it possible to guide their development.

Along with technical service, the repair of equipment is quite an important item of operating expense. The system of repair is also in need of constant perfection. Regardless of the fact that in this sphere, too, some experience has been accumulated, there are also quite a few problems here that are awaiting their solution. For example, is there necessity for the capital repair of equipment? In practice during the past few years, about three percent of the apparatus of the total park of radio navigation, radio location and landing facilities, and not more than one percent of the communication equipment was subject to capital repair. Does it not follow from this that it is expedient to limit ourselves to current and average repair, restoring, as the need arises, the worn-out parts, in particular the electromechanical units?

It is evident that the demands for the quality of current repair are growing. Unfortunately, the equipment that is put into operation does not have repair specifications and frequently--also does not have a precise method for the search and elimination of faults, the replacement of elements that have failed. There is a lack of necessary tools and display-stand diagnostic equipment.

But the good material equipment of the ERTOS bases is still no guarantee of the high quality of routine repair. Also necessary is an adequate level of training of the engineering-technical personnel. The educational institutions of the industry have carried out a reorganization of academic plans and programs. Today future specialists receive solid knowledge and practical skills in regard to technical service and repair of the most modern equipment. It would be desirable, however, that the industrial enterprises which manufacture the latest technical equipment took a more active part in the matter of training the specialists.

There also purely organizational questions that demand solution. Thought is being given to the creation in a number of large airports of well-equipped shops for the routine repair of electronic equipment, and routine and medium repair of electromechanical units. Subsequently they could develop into distinctive specialized centers for technical service and repair. Then, in response to signals by the centralized automized control system, specialists would be sent to the aircraft for the effective replacement of the unit or assembly that has failed (or which, according to the prognosis, does not have a sufficiently high reliability). The removed assemblies and units would be turned over to the center for technical service and repair for the conducting of a thorough technical diagnosis and and subsequent restoration.

Such a path of development of the system of technical service and routine repair will make it possible to increase the quality of the work of equipment to a considerable extent, the efficiency of its use and the labor productivity of the specialists.

The question concerning the extent to which such centers must be represented in every regional air transportation system is still open. There is no doubt only about the fact that the further development of the ERTOS service must be based on centralization and automation of control and administration, and the centralization of technical service and repair. It is precisely along this path that one sees the possibility of overcoming the difficulties that have been noted, including--the solution of the problem of cadres. There is every reason to propose that, in spite of the significant growth of fixed capital, by virtue of the more rational organization of technical service and repair, along with the increase in the reliability and durability of equipment, we will succeed in avoiding substantial increases in operating and labor expenses, that is to say--increase the efficiency of the work of the ERTOS service.

8970
CSO: 1829/226

AIR

PRESENT, FUTURE AIR TRAFFIC CONTROL SYSTEMS

Moscow GRAZHDANSKAYA AVIATSIYA in Russian No 4, Apr 82 pp 14-15

[Article by T. G. Anodina, chief of the Main Administration of Electronic Equipment of the Ministry of Civil Aviation, winner of the USSR State Prize, doctor of technical sciences: "Air Traffic Control — Problems and Solutions"]

[Text] In our current understanding the air traffic control system should be viewed as a single complex which supports all stages of the flight of an air ship from takeoff to landing. It includes not only technical equipment (on the ground and in the aircraft) but also all the methods of rational construction of air zones, systems of flight planning, and the like. Moreover, the controller and flight personnel, who operate according to definite rules and procedures, should be considered a component part of the complex. It follows from this that insuring high values for the main indicators of an air traffic control system — safety, regularity, and economy of flight — demands an integrated solution to a whole series of technical and organizational problems. Improvements in air traffic control systems should be economically substantiated. Therefore, determining the ways to develop the system becomes an important scientific problem. This problem was thoroughly discussed at the scientific conference "Problems of Air Traffic Control in the Year 2000," held at the Scientific Experimental Center for Automation of Air Traffic Control and organized jointly with the Scientific-Technical Council of the USSR Academy of Sciences.

When we speak of the prospects of air traffic control systems, we are naturally interested above all in the question of changing the intensity of air traffic. Several million flights are carried out in our country's air space each year today. The density of the flow of airships in different air traffic control regions differs. In the busiest regions (Moscow, Rostov, and Kiev) it reaches more than 100 flights in the peak hours.

In 1990 air traffic intensity for the country as a whole will increase substantially, and by the year 2000 it will increase even further. As for high altitudes (up to 12 kilometers), it will almost double because of raising the "ceiling" for new airships. It is apparent that the chief criteria of the air traffic control system should be chosen figuring on the possibility of handling precisely the maximum load.

But what quantitative values for the main characteristics for the work of air traffic control systems can we expect in the future?

Growth in the intensity of traffic demands a concentration of efforts aimed above all at insuring a high level of flight safety. This level has already risen more than two times in the last decade thanks to steps to improve the air traffic control system. By maintaining the planned rate of automation of air traffic control processes it will increase at least 2-2.5 times more each 10 years until the year 2000.

The most important qualitative indicator of aviation activity is flight regularity. This parameter is significantly affected by whether airports are equipped with rated landing systems. This is a substantial reserve for improvement. Calculations show that improving the air traffic control system can increase flight regularity by about 8-9 percent by 1990-2000. This seemingly small increase should not be confusing. After all, increasing flight regularity by just one percent can produce an economic benefit of roughly 20 million rubles.

Incidentally, one of the main criteria for evaluating efficiency of the air traffic control system is fuel economy. As a rule, the efficiency of any organizational-technical measure can be evaluated by this final result. Optimization of the structure of the air space and routes provided an annual savings of about 130,000 tons of fuel by the end of the 10th Five-Year Plan. In the 11th Five-Year Plan a savings of more than 600,000 tons of aviation fuel is contemplated by straightening routes, selecting more economical flight levels, and so on.

The introduction of automated air traffic control systems offers great prospects for improving economy. For example, use of the Start air traffic control automated system in Leningrad, Rostov, Sochi, and Kuybyshev reduces the time that an airplane is in the airport zone by 1-2 minutes and greatly decreases the load on the controller. And after the Terkas system was introduced in the Moscow air zone unproductive flying time in the waiting zone also declined noticeably.

Important reserves for fuel economy are reducing existing norms for vertical, lateral, and longitudinal flight leveling (we have in mind increasing the number of such levels and introducing parallel routes close to one another) as well as selecting routes with due regard for the meteorological situation.

To a significant degree the efficiency and quality of work of the air traffic control system depends on the skills of controller personnel. The continuing growth in the intensity of air traffic shows an increase (although not adequate) in the number of regular personnel. It is obvious that the ways to solve the problem are planned introduction of new technological processes and raising the level of automation, both of air traffic control itself and of the use of technical equipment.

Fully automatic systems will not appear in the foreseeable future, of course, but there is no doubt that computers will be able to solve many problems that only the human mind can handle now. Scientists are working today to establish the rational level of automation of air traffic control processes in each particular phase of development of the system. Considerable attention is also being given to refining forms and methods of using technical equipment by setting up devices to monitor and control the reliability of equipment at airports and on aircraft.

Research has shown that the entire diversity of air traffic conditions can be reduced to a series of typical regions which it is wise to equip with air traffic control systems that have different levels of automation (on the condition that it is possible to raise these levels during the modernization process).

Taking the conclusions of the scientists into account, programs are being written for development of promising ground and aircraft devices and complexes. Most important among them are regional, airport, and air center automated air traffic control systems and fundamentally new discrete-address secondary radar equipment, microwave landing systems, navigation systems that use satellites, and aircraft pilot-navigation complexes for all classes of aircraft.

The Start-2 and Strela complexes now being developed should become the foundation for automated air traffic control systems for airports and regional centers. They will help raise the work efficiency of the controller and reduce the role of the personal factor. But no attempts will be made to automate the entire control process. The first operations subject to automation are those which make it possible to receive the greatest gain in productivity.

In 1995-2000 a number of regions will need a higher level of automation than is provided by the current Start-2 and Strela. This means that the possibility of [illegible] development must be envisioned today.

The [illegible] information for future air traffic control systems will be [illegible] equipment with discrete-address interrogation. Their use will make it possible to increase the carrying capacity of the system. The precision of coordinate information will also rise significantly, by almost an order. The [illegible] address mode of work will make it possible to automate the transmission of data between the ground and the aircraft. A result will be automation of most of the crucial control problems, including warning of dangerous approaches of aircraft and resolving conflict situations.

The unfavorable influence of complex meteorological conditions on the regularity of air traffic and flight safety will be eliminated to a significant degree by the use of the new MSP-Platsdarm microwave landing system on aircraft and at airports. The effectiveness of its work depends less on local conditions at the airfields (in comparison with currently operated systems). In addition, the cost of building and installing this equipment is only one-third to one-half of present costs.

When speaking of future air traffic control we cannot fail to mention the use of spacecraft. The fundamental difference between satellite flight support equipment and traditional equipment is that the operating zone of the satellite equipment does not depend on the flight altitude of the aircraft. This eases navigation problems for all classes of aircraft, including MVL [ex- [illegible] unknown] and PANKh [expansion unknown] airplanes and helicopters. The future promise of setting up a satellite system also derives from the fact that new MVL systems designed for instrument flight will be put into use in the period until the year 2000. Furthermore, most of them will be used on routes in the Far North, Siberia, and the Far East where it is economically disadvantageous to set up a ground network of equipment for communications and low-altitude flight support. It appears that an air traffic control system

using spacecraft can be based on already proven technical equipment and information exchange channels now in use (for other purposes, it is true). By using satellite communications air traffic control agencies will be able to have complete information on the state of all air traffic in the country.

Communications will undergo further development at other levels as well. In general, communications is a very important link in the overall air traffic control system. Until the present day spoken radio communications between the controller and aircraft crews has been the principal form for transmission of command information regardless of the method of control and level of automation of air traffic control processes. But to free the controller from subsidiary operations not directly related to air traffic control, the transmission of other forms of information (nonoperational standard, technical, commercial, and meteorological information) should be completely automated. These functions will be performed by transmitting and receiving radio centers which are being developed for airports of different classes. They will have automatic electronic tuning, built-in monitoring, and remote control. At the same time the processes of transmitting telegraph information will be automated on the basis of electronic switching centers of different levels.

According to calculations, the introduction of automated communications systems will reduce the volume of spoken information transmitted by 90 percent, which will make it possible for each controller to serve 50 percent more aircraft.

There has also been progress in building pilot-navigation equipment. Its distinctive features must be a substantial rise in the overall quality of piloting and an improvement in the conditions of technical maintenance of the equipment. The use of new aircraft control complexes with higher reliability and technical capabilities will make it completely possible to automate control in all phases of flight, including landing in minimum weather conditions. The on-board equipment of the aircraft of 1995-2000 will combine all control and indicator devices (including automatic field devices and engine regulation devices) into a single complex.

Work on scientific substantiation of the above-listed problems and work to plan the development of flight support equipment and arrange this equipment in an optimal manner throughout the country's territory and on civil aviation aircraft is becoming very important today. To solve these problems specialists at the Scientific Experimental Center for Automation of Air Traffic Control have built modern complexes that make it possible to conduct mathematical and half-scale modeling of air traffic control processes. It is expected that the complexes will also be used successfully to set up optimal air traffic control systems in the CEMA countries.

Thus, further improvement of the air traffic control system will require solutions to numerous major technical and organizational problems. But the current level of development of domestic and foreign science and technology makes us entirely confident that they will all be solved.

11,176
CSO: 1829/214

[illegible] AVIATION PLANT [illegible] DISCUSSED

Moscow GRAZHDANSKAYA AVIATSIYA in Russian No 2, Feb 82 pp 26-27

[Article entitled: "Key Factors of Acceleration"]

[Excerpts] Among the aviation repair enterprises of civil aviation the Bykovo Plant No 402 occupies a special place. This is a veteran plant--one of the oldest in Aeroflot: In November 1981 it observed its 50th anniversary.

Fifty years is a time of labor maturity. And the successes of the collective of the plant are a direct confirmation of this. Today the reapir of the most modern aviation equipment is mastered here: The heavy cargo planes IL-76T, the multipurpose helicopters Mi-8, and the jet engines D-30.

The aviation repair workers of Bykovo have more than once become the victors in the All-Union Socialist Competition among the plants of Aeroflot. For the fulfillment of plan tasks, the introduction of advanced technology in production, and the high quality of repair of aviation equipment, the Plant No 402 was awarded the Order of the October Revolution in 1973. On the eve of its jubilee, the collective was honored with the Certificate of the Presidium of the RSFSR Supreme Soviet.

Every year the volume of production increases and the economic indicators improve. Thus, during the past five-year-plan the output of production increased by more than [illegible] percent, and labor productivity increased by 37.2 percent. The first year of the 11th Five-Year-Plan has also been successfully completed--by the fulfillment of plan tasks ahead of schedule. The quality of repaired equipment is invariably high.

What [illegible] the success of the aviation repair workers of Plant No 402? This [illegible], Valentin Nikolayevich Kuz'menko, says:

[illegible] organization of labor and the administration of production [illegible] important place in the development of technical progress. The ASU [illegible] finds broad application here. It suffices to say that [illegible] operates at the plant, which is equipped with four high-speed [illegible] and the annual economic effect from the use of the ASU ap[illegible] rubles.

The collective strives to increase the operational reliability of the output pro[illegible] and to prolong the inter-repair and scheduled resources of the aviation

equipment being repaired--by virtue of the completion of construction jointly with scientists, designers and production workers. The connections with science also help to perfect constantly the technology of repair and to adopt more progressive methods of work.

In the development of technical progress, the plant rationalization specialists and inventors are making a great contribution. Their creative work has been noted by many awards of the Exhibition of the Achievements of the National Economy of the USSR--more than 160 innovators have been honored with medals of the Exhibition.

Unremitting attention is being given in our plant to the quality of repair of aviation equipment--one of the chief criteria of the efficiency of the entire collective. A more detailed familiarity with the everyday working life of the plant helps us to pursue concrete ways of their practical realization. Perhaps it is worth adding to the words of the director only one thing: These principles have stood the test of time and helped to carry out successfully the basic reorganization of production when new machines and mechanisms arrived to take the place of aviation equipment taken our of operation. The collective of Plant No 402 almost simultaneously had to master the repair of the aircraft IL-76T, the helicopter Mi-8 and the engine D-30! Practically not a single one of the shops for basic production escaped serious reconstruction in so doing.

At times the mastery of new production makes output feverish and leads to a lowering of economic indicators. But here the aviation repair workers not only coped with difficulties, but also secured an increase in labor productivity.

The floor [is given] to the chairman of the plant committee of the trade union, Ivan Alekseyevich Gureyev:

An indispensable condition for the creation of a workmanlike disposition in the collective is competition that has been clearly set into motion. In the past year, the all-plant competition took place in four stages in our plant, which made it possible to map out concrete boundaries and to sum up the fulfillment of obligations. Thus, about 400 workers obligated themselves to fulfill the targets of the first year of the 11th Five-Year-Plan by 7 November. They kept their word.

Good results in labor competition were attained by the collectives of the shops for the repair of aviation engines and the assembly of IL-76T aircraft, which secured the fulfillment of a significantly increased plan for production output, as well as by many production sections and brigades, including the collectives headed by L. A. Antipova, V. I. Bodunova, V. A. Timashpol'skiy, A. P. Lebedev, Ye. Ye. Krotov, and S. V. Vasilisin. In the individual competition, the metal-worker and fitter R. Kh. Yafunyayev, the aviation technician V. I. Karnov, the galvanizer V. M. Kedrov, the mechanic and instrument-builder V. V. Gudkov, the metal-worker and fitter-assembler A. N. Pluzhnikov, and others.

The movement for the creation of complex brigades, in which the assessment and payment of work are conducted in accordance with the coefficient of labor participation, is being actively developed in our enterprise.

Life has shown that it is precisely with the brigade form of the organization of labor that the highest effect in terms of the interest of the toiler in the final results of work is obtained. But the transition to the brigade form requires a large amount of organizational and educational work. Here formalism and the aspiration to report somewhat more quickly about what has been achieved are especially inadmissible. For this reason, the plant committee devotes much attention to explaining to the workers the peculiarities, the advantages and benefits of the brigade form. Studies have been organized on this subject in the schools of communist labor, periodically meetings and interviews are conducted, and a statute has been created on the complex brigade.

The new form has already been introduced in two shops: Training for the production and repair of units of the engine D-30. This is a much-promising beginning.

The secretary of the committee of the All-Union Lenin Young Communist League, Vladimir Nechayev:

We are holding competition both among individual workers (according to individual creative plans) and among collectives of the Komsomol youth brigades and the shop Komsomol organizations. Use is also made of such a form as the obligation to make a labor gift to one or another kind of important date. For example, in honor of the 50th anniversary of the plant, the Komsomol members reconditioned an IL-18 aircraft on two Saturdays. And our gift to the 19th Congress of the All-Union Lenin Young Communist League will be the above-plan repair of the helicopter Mi-8. This initiative was approved by the Ministry of Civil Aviation and the Central Committee of the All-Union Lenin Young Communist League.

Young workers are helped to work better, more efficiently and with greater quality by contests of professional mastery held by the Komsomol committee, as well as by [illegible] units of the "Komsomol searchlight"--for observance of the production process, labor discipline, economy and thriftiness.

For the constant concern for the perfection of production, the introduction of the means of mechanization and automation, and progressive technology, the deeds of the administration of the plant, the party and public organizations have been noted literally from the day of its founding. Already then, when the airplanes Li-2 constituted the basic production, the task of the mechanization of the tin-smith and riveting operations was successfully solved.

With the mastery of the repair of more complex aviation equipment, the technical equipment of production increased. For the repair of the IL-18 aircraft, for [illegible] docks were developed and introduced, as well as lifting and transportation gear. The beginning of the use of press riveting goes back to the [illegible].

At present of the plant consists of modern machine tools and equipment with program control, production lines, electronic computers, and progressive technological processes. In the repair of aviation engines, for example, electronic program devices for the running in of fuel pumps have found application. And the use of production lines in the cleaning of assemblies and parts, or, let us say, in the repair of passenger seats, increased labor productivity and improved working conditions.

During the past years much attention has been given to the mastery of methods for restoring parts. For this, work is being done in accordance with agreements with the scientists at the plant on the spraying and thick-layered chromium plating of metals and thermo-diffused alloying.

Since 1966 there exists in the plant a subdivision which deals with questions of the scientific organization of labor and the administration of production. Public councils for the scientific organization of labor and creative brigades have also been created. One of the directions of their activity is the investigation of the reasons for non-rhythmic work of individual sections. For example, at one time the tin-smith-riveting shop developed problems. For the normalization of its work it was proposed to carry out several concrete measures making possible the elimination of the reasons for the stoppages.

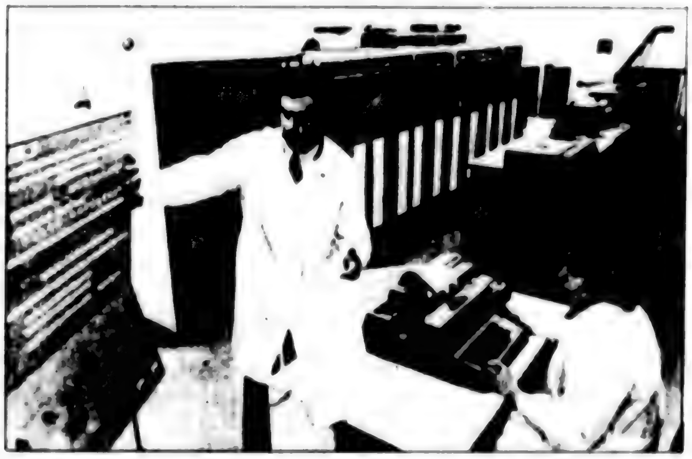
The introduction of ntework planning on the basis of the use of the means of computer technology and automatic control systems. Now several automatic control systems have been introduced: Basic production, material-technical supply, labor and wages, elaborations of aviation equipment, etc. Considering this experience, the Ministry of Civil Aviation entrusted Plant No 402 with the responsibility of the head enterprise for the development and introduction of automatic control systems in aviation repair production.

In 1979 a system of the comprehensive control of the quality of repair of aviation equipment was introduced at the plant, which had become the further development of the system of non-defective work and production delivery of the Department of Technical Control from the first presentation. It guarantees hight technical-economic indicators for the work of the plant, brings into operation factors of moral and material incentive, high quality of finished production, and the development of various forms of socialist competition.

In carrying out the decisions of the 26th CPSU Congress and the November (1981) Plenum of the CPSU Central Committee, the collective of the plant focused its attention on the further increase in the efficiency of production and the perfection of the economic mechanism.

Chief economist Vladimir Ivanovich Druzhinin:

In the new conditions of management and the reorganization of the economics of production, we are confronted with a responsible task--to secure the maintenance of the growth rates of production output with the maximum economy of material and labor expenditures. We are placing a great deal of hope on the introduction of the standard of net production in the current year--which will make it possible to assess more objectively the activity of the enterprise. At last the notorious "production volume", which earlier figured as the basic criterion, is becoming a thing of the past. During the second year of the 11th Five-Year-Plan the plant accepted a stepped-up plan, the fulfillment of which requires the mobilization of all resources; first of all, to attain the further increase of labor productivity and the reduction of the production cost of the repair of aviation equipment.



Many different tasks are solved at the plant with the aid of the computer center. Senior engineer and programmer S. Kolotilin and computer operator T. Molotkova are familiarizing themselves with the data received.

It must be said that in increasing the economic indicators the collective can be fully guided by accumulated experience. Thus, a substantial increase in the output of production during the mastery of new technology was secured exclusively by virtue of a growth of labor productivity. During the past year it turned out to be possible to reduce the production cost of repair and also to turn out above-plan production for 500,000 rubles and to realize production above the plan for more than one million rubles.

Photo Caption

1. p 26 Assembly shop for the large-cargo transport planes IL-76.

8970
CSO: 1829/213

GAGRA BELTWAY TUNNEL CONSTRUCTION PROGRESS DISCUSSED

[Editorial Report] Tbilisi KOMUNISTI in Georgian on 1 May 1982 page 4 carries Abkhazian correspondent I. Gobechia's 700-word report on progress in the construction of the Gagra Beltway, now in its third year. The author reminds readers that this project, designed to relieve congestion and reduce pollution in this popular Black Sea resort area, stems directly from the CPSU CC and USSR Council of Ministers decree on the economic and cultural development of Abkhazia. It involves four tunnels totaling 4.5 km, and the construction outfits include the highly skilled and experienced crews of the Inguri GES. The tunnels have been punched through, and it remains now to complete the roadway (lower) portions. In the future, other Black Sea resort towns will get similar beltways.

MULTI-BED SPECIALIZED TRUCKS DESIGNED IN GEORGIA

[Editorial Report] Tbilisi KOMUNISTI in Georgian on 24 April 1982 page 1 carries Sh. Amashukeli's 800-word piece on an innovative new multi-bed truck that is especially useful for grape harvest transport. It has a built-in crane with which four or five beds can be mounted or removed for best deployment on location. Just a few have been built so far, but they have proved their worth, and many more are needed. In addition, a new small-sized truck has been designed to move down the vineyard rows, collect the grapes, and deliver them to the main trucks, thus saving much labor and time. Both items were developed by Avtotranstekhnika. 6854

CSO: 1813/737

BRIEFS

SCRAPERS FOR NICARAGUA, CUBA--Eighteen flatcars were dispatched from the Mogilev Motor Vehicle Plant imeni S. M. Kirov recently. They were loaded with high-powered scrapers for Nicaragua. The automobile builders filled their Latin American friends' order ahead of schedule. Mogilev machines have also been dispatched to enterprises in the GDR and Mongolia ahead of schedule. Now the next shipload of scrapers has been prepared for delivery to Cuba. [Text] [Minsk SOVETSKAYA BELORUSSIYA in Russian 23 May 82 p 2]

CSO: 1829/228

BRIEFS

URAL METRO IN SVERDLOVSK--A new shaft of the Ural metro has been dug in the centre of Sverdlovsk, near the 1905 Square. The underground will connect the Uralmash industrial area with the city's southern districts. [Moscow MOSCOW NEWS in English 9-16 May 82 p 9]

CSO: 1812/114

WORK OF SEAPORTS IN APRIL REVIEWED

Moscow VODNYY TRANSPORT in Russian 13 May 82 p 1

[Article: "Monthly Report on Transportation Centers — Improve Cooperation"]

[Text] The results of work for the first four months of the year testify that the collectives of transportation enterprises, making skillful use of continuous, mutually coordinated planning, are steadily building up the volume and pace of shipping goods. Shipment of goods for the national economy was 13.9 percent more than in the same period of the preceding year.

The work rhythm was highest in April. A great deal was done at the transportation centers to celebrate May First, the Day of International Solidarity of Working People, in a worthy manner. Shipment of goods from ports to consumers rose 3.7 percent in comparison with March.

The delivery of railroad cars to seaports improved noticeably in April. Almost 1,000 cars a day more were loaded compared to April of the preceding year. Port elevators were used more extensively to speed up ship processing. Timber and fishing ports were used more actively than in March for transshipping national economic cargo. More of these goods were hauled by river and motor vehicle transportation. For the port railroads as a whole, above-norm presence of railroad cars with export and transshipment goods was reduced.

The shipment of bulk goods in April was most stable from the transportation centers of Leningrad, Tallinn, Riga, Klaypeda, Reni, Il'ichevsk, Nikolayev, Berdyansk, Feodosiya, Novorossiysk, and Tuapsi.

Unfortunately, the Far Eastern Railroad failed again in April to deliver enough railroad cars to seaports. The allied workers are not making full use of reserves for increasing the traffic capacity of the transportation region. Workers of the Far Eastern Steamship Company are not working well with railroad workers to refine the application of continuous planning. This applies above all to bulk cargo.

During April the planned numbers of railroad cars for cargo loading were not delivered to the ports of the Baltic region and Odessa. Transshipment at the Poti and Batumi transportation centers was worse. The planned amounts of shipment of cargo in packages were not achieved at Arkhangel'sk, Leningrad, all the Baltic ports, Odessa, and Il'ichevsk. The shipment of sugar from Murmansk,

Leningrad, Kaliningrad, and Odessa was delayed in April because of failure to deliver boxcars.

The managers of the October, Baltic, and Odessa railroads did not meet their plans for delivery of railroad cars for bulk cargo at these ports despite a number of very strict orders from the Ministry of Railroads. This happened because the appropriate coordinating commissions of Soviets of Peoples Deputies also failed to give this matter the necessary attention.

There were cases of violations of plan discipline on the part of the managers of steamship companies and ports in April also. Evidence of this is seen in failure to use railroad cars. The situation was particularly bad in this respect at a number of ports of the Yuzhflot [Southern Fleet] State Economic Association which permitted failure to use 1-2 cars by the report hour and did not request rolling stock on the planned scale for certain types of cargo. These things were allowed by the managers by the ports of Kherson, Kerch', Reni, Izmail, Nikolayev, Poti, Vladivostok, and Nakhodka.

These things should receive fixed attention from party, trade union, and Komsomol committees and the basin press. The collectives of all these seaports must work on the slogan of requesting every car needed for the established assignment and using every car delivered. Managers at all levels should direct their efforts to meeting this challenge.

The intensity of work at all transportation centers will increase in May. Transshipment of bulk cargoes and sugar is to increase significantly. The river steamship companies, above all the Volga-Don and Northwest companies and the Ukrainian SSR Main Administration of the River Fleet, must be more actively involved in solving this problem.

It is also necessary to intensify the hauling of cargo from ports, in particular the most valuable cargo, by motor vehicle transportation. The largest amount of such cargo has accumulated in the port of Leningrad.

Cooperation among railroad, maritime transportation, and port workers in Arkhangel'sk must be improved. This transportation center has reserves for increasing its carrying capacity. The managers of the Northern Railroad and the Northern Maritime Steamship Company must put them to use and organize mutual records of the delivery and loading of railroad cars.

The ministries of Railroads and the Maritime Fleet have set up a unified system for automatic records of the delivery and processing of railroad cars in ports. Computer equipment of the seaports and communications lines of the Ministry of the Maritime Fleet are used to transmit information. The system began operation in April. But there were cases where the managers of certain railroads and seaports sent inconsistent data to the ministries.

Shipment of goods from seaports in the planned volume must be guaranteed in May. All the collectives and managers of the enterprises of the transportation centers as well as the coordinating councils and commissions must direct their attention to meeting this challenge.

Fulfillment of April Plan (%)

Ports	Transhipment of Cargo Seaports	Shipment of Goods from Ports
Leningrad	125.2	101.8
Kaliningrad	114.5	81.9
Arkhangel'sk	110.9	80.1
Murmansk	102.0	198.5
Tallinn	102.5	109.9
Riga	114.2	105.9
Klaypeda	111.4	99.8
Odessa	109.5	95.9
Il'ichevsk	108.3	77.4
Kherson	107.8	74.1
Nikolayevsk	111.2	101.7
Feodosiya	106.2	81.6
Novorossiysk	115.4	102.3
Poti	114.9	82.2
Batumi	100.8	86.7
Zhdanov	101.8	107.0
Kerch'	104.8	74.0
Izmail	101.4	82.8
Reni	100.6	104.5
Baku	112.0	-
Vladivostok	112.9	100.3
Nakhodka	107.2	85.3
Petropavlovsk-Kamchatskiy	104.8	-
Vanino	107.5	88.5
Kholmsk	105.4	132.3

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WORK OF RIGA PORT FLEET REVIEWED

Moscow VODNYY TRANSPORT in Russian 13 May 82 p 2

[Article by O. Ivanovskiy, chairman of the peoples control group of the port fleet: "The Concerns of the 'Little' Fleet"]

[Text] The first year of the present five-year plan was noteworthy for the collective of the Riga commercial seaport in many respects. On 2 December the dock workers fulfilled their year's assignment for cargo processing. For the first time in our history we passed the 7 million mark for cargo turnover. The volume of processing of export-import goods was raised 15.5 percent compared to 1980, and this increase was obtained by increased processing of labor-intensive cargo which, also for the first time, comprised 55.8 percent of the total volume of labor of the Riga dock workers.

These indicators reflect the contribution of all the subdivisions of our vast enterprise, including the collective of the port fleet. The crews of the bunker ship Lilaste, the diesel tugs Tsiklon, Dzintars, Tayfun, and Uragan, the pneumatic grain loader, and the MOS-2 washing-cleaning station worked especially well last year. The leading collectives of the port fleet are characterized by constant and effective concern for conserving fuel-energy resources and thrifty management. The diesel fuel conserved last year would be enough to operate a tilting tug for 2.5 months. In addition, a technology to burn recycled fuel has been introduced at the MOS-2 to achieve maximum conservation of fuel resources. This makes it possible to save a significant amount of fleet mazut oil.

A number of crews successfully introduced the Shchekino method last year and began to work on the principle of combining occupations. This movement was begun as far back as 1976 by the collective of the tilting tug Tayfun, which still today is one of the leaders in development and dissemination of useful innovations. Great credit for this goes to the captain of the Tayfun, the experienced navigator and highly respected commander Yu. Sergeyev. At the level of the entire port fleet the Shchekino method unquestionably promises a great deal with respect to economic efficiency and carrying out the slogan of the current five-year plan: "The Economy Must Be Economical."

All the above by no means signifies that we are completely satisfied with the results achieved and that a "green light" has been given to progressive innovations. On the contrary, we have many problems and work to solve them is still

going slowly. I will only deal with those ones which are crucial for all our indicators and fulfillment of the obligations of the second year of the five-year plan.

The November 1981 Plenum of the CPSU Central Committee correctly observed that many sectors of our economy need a substantial improvement in the material-technical supply system. Breakdowns in supply, even short ones, literally disorganize our work. Straightening out the material-technical supply system, which does not require additional expenditures, can have a great national economic impact.

These statements apply completely to the collective of the port fleet. The ships are constantly experiencing difficulties because they do not have things which are essential in their everyday work such as rags, cleaning powder, and mittens. They are even short of electric lights. And how can machines be "taught" to work without motor and spindle oil? We are experiencing an especially severe shortage of this type of oil, which goes to the tilting tugs and is used by them in the control system for the adjustable pitch screws.

We think that the system of planning the work of port fleets is also imperfect. The chief problem is the unrestrained growth in assignments. In 1981 the collective had a very intensive plan. In order to insure its fulfillment it was necessary for the peoples control group to assign a special person to keep track of accounts and realization of plan assignments by the tilting tugs, which are the primary units on which fulfilling plan assignments actually depends. And there was not a single month in the entire year in which it was not necessary at the end of the month to combine efforts to help some ship or other fulfill its plan.

Why does such a nerve-racking situation develop? Analysis shows that it is largely because work must be sought on the outside, in organizations that are not related to the Riga seaport . Even today under the existing plan the port provides us with only 78.4 percent of the work, and the rest must be gotten outside. With the growth of commodity turnover in the port we will not have time left to work in other organizations, and this deprives the port fleet of the possibility of fulfilling its plan assignment through work for clients. The conclusion suggests itself: the plan assignment for the port fleet should be given on the basis of actual work in the port, which is easy to calculate.

Finally, the third problem arises directly from the preceding one. The more intensively the fleet works, the more critical the question of keeping it in good technical condition becomes. The point is that the ship machinery needs periodic scheduled inspection and maintenance. With our present plan for the tilting tugs, taking a ship out for three days of scheduled maintenance creates a real danger of not fulfilling the monthly plan. And because our plan will not be lowered in the future, but more likely will be increased, there is just one way out: increase the length of time ships work between scheduled maintenance dates and reduce the time of scheduled maintenance.

This is clear and simple in theory. But to make this solution a reality we must bolster our repair facilities and put repair mechanics back on ships such as tugs and pneumatic grain loaders. Time has shown that it is neither wise nor

economically justified to remove the position of repair mechanic from the crew of such ships.

We will give a simple calculation: prolonging the operating period of a tug by one day saves 3,908 rubles, whereas the annual wages of a repair mechanic are about 2,000 rubles. By comparing these figures it is easy to see which is more profitable for the port fleet and which is not. And after all, the economy must be economical.

One more thing must be mentioned: the ships of the port fleet have a category of low-paid workers: seamen, machinists, motor mechanics, and cooks. It is the opinion of the port fleet that it would be wise to find a way to give material and moral incentive to the rank-and-file personnel of these ships, the people who make the greatest contribution to fulfillment of the plan of their subunit and of the port as a whole. This would also have a good impact on the quality of technical upkeep and servicing of the ship.

I believe that if all the pressing problems of our work today find positive solutions, the results of the work of the "little" fleet will be even more significant.

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WORK OF FLEET TECHNICAL SERVICING SECTION REVIEWED

Moscow RECHNOY TRANSPORT in Russian No 3, Mar 82 pp 9-10

[Article by Yu. Ronzhin, chief of the Levshinskiy BPU: "The BPU Has Problems"]

[Text] The Levshinskiy BPU [shore production section] of the Zaozerskaya REB [maintenance and operations base] of the fleet was organized in 1965. At the present time 53 people work in it. Highly qualified specialists make up the backbone of the collective. Many of them are extension students at institutes and tekhnikums and have mastered two and three occupations. The best brigade, which is headed by engineer-mechanic L. N. Pozdeyev, earned the title brigade of communist labor.

The BPU has a shop to repair the fuel equipment of internal combustion engines, a laboratory for monitoring and testing instruments, a radio repair shop, and other subdivisions that enable us to do technical maintenance work on practically all ship equipment.

We have introduced aggregate repair on a broad scale for the parts and assemblies of fuel equipment, the high-pressure pump and nozzles of main and auxiliary engines, regulators, and the fuel equipment of auxiliary boilers. Technical servicing and repair of radios, command-broadcasting and electrical radio navigation equipment, television sets, and radio receivers has been organized based on this method.

The BPU has mastered the manufacture of rubber packing rings for practically all the packing fixtures of diesel engines. The rings are made by vulcanization in press molds in a special MB-AiB crude oil-gasoline resistant rubber furnace. All electrical measuring instruments, pressure gages, and compasses are tested and repaired. The areas that house ship engine compartments are heated during technical servicing. MP-3445 motor-driven heaters or EK-18/1216 electrical air heaters, produced by the Khlebnikovskiy Stavropol' Ship Repair and Machine Plant, are used for this purpose.

The BPU has a design No 376U diesel ship at its disposal for use in providing technical assistance. It has equipment for gas and electrical cutting and welding.

The work of the section is planned by the ship management service of the steamship company, which determines the list of diesel ships and ship equipment to be turned over to the BPU for technical servicing in the upcoming navigation season and also

schedules for taking ships out of operations. The production program of the BPU for the navigation season, which has reached 48,000 worker-hours, is figured by norms used in the Ministry of the River Fleet.

During the winter, the section performs technical servicing on diesels and other ship equipment for a total of 50,000 worker-hours, which meets the needs of the ships assigned to the Zaozerskaya REB of the fleet.

During the navigation period specialists of the section do 1,800-1,900 servicing jobs on 900-1,100 ships. Although they regularly fulfill production plans overall at a level of 101-103 percent, the BPU is not managing its principal task, which is to provide the planned volume of technical servicing for the fleet. Moreover, its share of the total volume of work is decreasing year after year, while at the same time the Ministry of the River Fleet has posed the task of raising it to 85 percent by 1985.

Years	Share of Technical Servicing of Fleet in Total Volume of BPU Work During Navigation Season, %	
	Planned	Actual
1977	70	62
1978	75	51
1979	78	50
1980	80	38

What is the reason for this situation? One of the reasons is the low level of technical operations of some of the ships owing to the inadequate skills and work experience of graduates of the river schools and tekhnikums who, because of a lack of workers with appropriate qualifications, occupy command positions in the fleet. Another, equally important reason is incomplete and poor quality repair work on the fleet, which is chiefly the result of the shortage of spare parts for ship diesels and other equipment.

The supply of these parts at the BPU is no more than 15-20 percent of the requirement. As a rule there are no spare parts and aggregates for engines of the series NFD, G60, Th8.5/11, Ch10.5/13, and Ch12/14. The greatest problems occur with bearing bushings, fuel pumps, internal cooling plants, and cylinder head gaskets.

It is often necessary to restore FAK refrigerators which have been used for more than 20 years. Practically no spare parts for them are available.

The problem of supplying engines for hydrofoil ships has become critical. Because of the low quality of work they cannot have confidence in the reliability of engines that have been overhauled at the Tol'yatti ship repair and machine plant.

Under these conditions, instead of conducting planned technical servicing the BPU must occupy itself with navigation repair of ships in order to restore their work capability. This practice leads, of course, to a worsening of the technical condition and lowering of the work capability and reliability of the fleet.

The Ministry of the River Fleet adopted a resolution to provide all subdivisions engaged in comprehensive servicing of the fleet with the necessary number of skilled workers. But this problem is not being solved adequately yet. The [illegible]shinskiy BPU does not have a full complement of specialists during the navigation season, which is the most important time.

The next problem is expanding production areas and improving technical equipment. For normal work we must have sections to treat and dry electric motors and alkalize and flush refrigerators, a compass repair shop, and numerous production subdivisions and technical means. But the technical supply situation is extremely unsatisfactory. In the last five-year plan the BPU received just three units of equipment instead of the 30 units envisioned by the development plan.

In 1979 guaranteed servicing of ship equipment was supposed to be introduced in the fleet. The job list was ratified. But introduction of the system is being delayed by the lack of replacement and spare parts and also because a statute on guaranteed servicing still has not been developed and ratified. In other words, the questions of moral and material incentive for workers, the question of the responsibility of the BPU when machinery goes down before the guarantee period is expired, and other organizational matters have not been resolved.

The brigades of specialists in the shore production sections should be headed, according to the existing statute, by line mechanics. However, a tendency has been seen recently in the Kama Steamship Company to reduce the number of line mechanic positions and replace them with brigade leaders taken from the sixth rank of workers. This substitution is unjustified because it leads to a lower level of technical servicing of the fleet and has a negative effect on its reliability and work capability.

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CSO: 1829/223

OCEAN AND RIVER

ORE SHIPPING BY RAIL OR RAIL-WATER MIXED TRANSPORTATION COMPARED

Moscow RECHNOY TRANSPORT in Russian No 3, Mar 82 pp 6-7

[Article by P. Olenev, division chief, Main Cargo Administration of the Ministry of the River Fleet: "Ore Shipping in Mixed Transportation"]

[Text] The document "Basic Directions of Economic and Social Development of the USSR for 1981-1985 and the Period Until 1990" contemplates a 19-20 percent increase in the cargo turnover of river transportation. Where expedient, as much cargo as possible is to be switched from rail to river transportation. Carrying out the decisions of the 26th CPSU Congress, it is economically advantageous to increase the shipping of ore from the Kursk Magnetic Anomaly (KMA) in direct, mixed rail-water transportation. This ore is shipped to the Chelyabinsk Metallurgical Plant and the Nizhniy Tagil Metallurgical Combine imeni V. I. Lenin.

The maximum shipping volume was achieved in 1979, 700,000 tons.

Ten years of working experience demonstrated that delivery of ore to Chelyabinsk and Nizhniy Tagil with transshipment at the ports of Ust'-Donetsk and Perm' has a number of advantages over direct rail transportation.

It is the conclusion of the Chelyabinsk Metallurgical Plant that KMA ore should be delivered only by mixed rail-water transportation during the shipping season. With this form of transportation the plant saved more than 278,000 rubles on the difference in rates in 1974 alone, and the distance freight was shipped by rail was cut by 893 kilometers to Chelyabinsk and 1,091 kilometers to Nizhniy Tagil.

Organizing ore delivery to plants in the southern Urals and mixed rail-water transportation with transshipment at Perm' and Levshino helps switch more Kuznets coal for power plants of the Ukrainian SSR Ministry of Power and the Volga region and timber products coming from points on the Kama and the Ural and Siberian regions for enterprises of the Donets Basin and the Northern Caucasus to river transportation. In these cases the length of shipping of these items by rail is reduced 2,000-2,500 kilometers. This takes load off the transshipping capacities of the Ust'-Donetsk port, especially the highly productive automated transshiping complex, and improves the use of the traffic capacity of the Volga-Don Navigation Canal imeni V. I. Lenin. This is very important given the sharply reduced volume of shipment of Donetsk coal. Favorable conditions are created for using the fleet in a low-volume direction.

Because of the difference in rates, the transportation expenditures of the Chelyabinsk Metallurgical Plant are decreased by 0.64 rubles per ton of cargo carried in mixed transportation, while for the Nizhniy Tagil Metallurgical Combine the savings is 0.83 rubles per ton.

In 1980 1,191,000 tons of ore was shipped from the Mikhaylovsk Mining and Concentrating Combine to the Nizhniy Tagil Metallurgical Combine by transportation of the USSR Ministry of Ferrous Metallurgy, but just 205,000 tons of it was by direct mixed rail-water transportation. The Chelyabinsk Metallurgical Plant received 945,000 tons of ore from the Kursk deposit, including 300,000 tons in mixed transportation.

Thus, it is entirely possible to increase the volume of shipping in mixed transportation to 1 million tons.

The plan of the 11th Five-Year Plan envisions raising annual extraction of ore from the Kursk Magnetic Anomaly to 43 million tons and shipping about 8 million tons to the Chelyabinsk, Nizhniy Tagil, Orsk-Khalilovo, and Magnitogorsk metallurgical enterprises by rail transportation in 1982. Under these conditions new opportunities appear for a significant increase in the volume of ore shipping in direct, mixed rail-water transportation.

The technical-economic substantiation of the wisdom of switching cargo shipping from direct rail transportation to mixed rail-water transportation was done by a methodology developed by the Institute of Integrated Transportation Problems of USSR Gosplan. The presently used routes of ore train traffic were adopted for the calculation. Ore trains come to Nizhniy Tagil chiefly by two routes. The first is: Mikhaylovsk mine — Arbuzovo — Navlya — Bryansk — Sukhinichi — Gorenskaya — Tikhonova Pustyn' — Bekasovo-1 — Mikhnevo — Yaganovo — Voskresensk — Orekhovo-Zuyevo — Petushki — Vladimir — Gor'kiy — Kotel'nich — Piban'shur — Perm' — Chusovskaya — Smychka (distance of 2,487 kilometers). The second is: Mikhaylovsk mine station — Arbuzovo — Navlya — Bryansk — Sukhinichi — Uzlovaya — Ryazhsk — Penza — Kuybyshev — Ufa — Berdyaush — Chelyabinsk — Smychka (distance of 3,013 kilometers).

Trains also come to the Chelyabinsk Metallurgical Plant along two routes. The first is: Mikhaylovsk mine — Orel — Yelets — Gryazi — Tambov — Tonovka — Rtishchevo — Penza — Syzran' — Kuybyshev — Ufa — Kropachevo — Chelyabinsk (distance of 2,284 kilometers). The second is: Mikhaylovsk mine — Arbuzova — Navlya — Bryansk — Sukhinichi — Uzlovaya — Ryazhsk — Penza — Syzran' — Kuybyshev — Ufa — Berdyaush — Chelyabinsk (distance of 2,608 kilometers).

The wisdom of switching ore shipping from direct rail transportation to mixed rail-water transportation is determined by comparing capital expenditures for the entire transportation process.

The calculations confirmed the wisdom of shipping KMA ore in direct, mixed, rail-water transportation to plants in the Urals (Nizhniy Tagil and Chelyabinsk).

Comparative data on the decrease in costs are given in the table.

Table

	Calculated Expenditures		Change in Calculated Expenditures*	
Shipping Variations	Direct Rail Shipping, rubles/ton	Mixed Rail Water Shipping rubles/ton*	Rubles/Ton	For Full Volume of Shipping, rubles
Mikhaylovsk Mine — Nizhniy Tagil				
Route I	2.03	3.24/3	+1.21/+0.97	+596,500/+438,200
Route II	7.7	3.24/3	-4.46/-4.7	-2,198,800/-2,317,100
Mikhaylovsk Mine — Chelyabinsk				
Route I	5.22	3.56/3.24	-1.62/-1.98	-521,600/-537,600
Route II	7.42	3.56/3.24	-3.86/-4.18	-1,248,900/-1,345,900

* First figure for transshipment through Kambarka; second for transshipment through Perm'.

As the table shows, it is more economical to ship KMA ore to Nizhniy Tagil by the first route in direct rail transportation; for the second route it is better to use direct, mixed rail-water transportation. The decrease in calculated expenditures for transshipment through Kamarka is 4.46 rubles, while to Perm' it is 4.70 rubles.

It is more economical to deliver ore from Mikhaylovsk mine to Chelyabinsk in mixed rail-water transportation for both the first and second routes.

If even half of the ore volume being shipped were switched from direct rail transportation to mixed transportation, transportation costs would be reduced by 1,150,000 rubles for shipping to Nizhniy Tagil and 650,000 rubles for shipping to Chelyabinsk.

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PLANT WORKS TO CONSERVE METAL, FUEL, ENERGY

Moscow RECHNOY TRANSPORT in Russian No 3, Mar 82 pp 19-20

[Article by V. Burov, chief engineer at the Teplokhod Plant: "Put Economic Reserves to Work for the Five-Year Plan"]

[Text] The collective of the Teplokhod Plant, guided by the decisions of the 26th CPSU Congress on raising the efficiency of production and rational use of material and fuel-energy resources, is working hard to conserve rolled metal products, fuel, electricity, and thermal energy.

Following the practice of a number of machine building enterprises, the plant has set up a headquarters whose members include representatives of public organizations, chief specialists, shop and division heads, and leading production workers. The headquarters prepares proposals on differentiated distribution of assignments of the Ministry of the River Fleet. They are ratified by the plant directors and delivered to subdivisions. The headquarters monitors their performance and carries on methodological work related to finding reserves for economy. The monthly results of work done are reviewed at a meeting with the plant director, and once a year results are reviewed by the plant's standing production commission.

The work of the collective is organized according to plant statutes. They are used as the basis for writing annual plant and shop plans of organizational-technical measures to conserve materials, fuel, and energy.

Optimal norms and monitoring their execution are an important tool for productive management. The norms are the basis for calculating material requirements and for planning and carrying out assignments to conserve material resources. The norm bureau develops these norms and keeps track of compliance with them. The planning group of the supply division monitors provision of materials in conformity with the norms.

During the 10th Five-Year Plan the plant systematically fulfilled its assignments for lowering the expenditure norms for fuel and energy resources per unit of output. We saved an additional 1,700 tons of standard fuel, 9,600 gigacalories of thermal energy, and 5.4 million kilowatt-hours of electricity.

In the last three years assignments for conserving hot rolled metal products have been fulfilled, making it possible to reduce expenditures by 1,267 tons. The pace of the economy campaign did not decrease in 1981 either: 296 tons of rolled ferrous metals, 1,200 kilograms of drawn pipe, 400 kilograms of rolled tubing, 200 meters of thick-walled pipe, 210 cubic meters of lumber, 1,546,000 kilowatt-hours of electricity, 1,555 gigacalories of thermal energy, and 307 tons of standard fuel was conserved.

These results were achieved by rational metal cutting, reducing machining allowances, improving the design and reducing the material-intensiveness of articles, and more rational use of production by-products. At the present time the use coefficient of rolled metal at the plant has reached 0.84, including 0.87 for sheet steel and 0.95 for steel pipe.

The plant is working diligently to introduce low-waste technology and to reduce allowances. There is a specialized section for cutting high-grade rolled metal. The forge-press shop has equipment for punching parts out of waste materials. According to the 1981 program about 148,000 parts will be punched out of this material. Waste sheet metal six millimeters thick from cutting semifinished parts is completely used. All the parts of GPTS-4M tractor trailers except those made of five-millimeter sheet metal are stamped from waste metal.

The availability of usable waste products at the warehouse makes it possible to produce output, fittings, nonstandard equipment, and metal construction elements from them. In 1981 63.9 tons of metal was sent from the warehouse to production.

Improving the design of articles produced for the purpose of reducing their metal-intensiveness is very important for conserving materials. For example, modifying the installation diagrams of the buttresses and fenders of the KP15-30 floating crane (design No R-99) made it possible to save 10 tons of metal a year, while modification of the design of the support drum saved 67 tons of rolled sheet metal, and improving the design of the sole plate saved 50 tons. Metal use was reduced by 36 tons by cancelling the bulkhead on the 40th frame of the crane.

Several steps are being taken at the plant to save fuel and energy. Energy-conserving industrial processes are widely used. Energy-intensive production equipment is being modernized, while the energy system is being developed and refined. The introduction of gas flame hardening of engine parts instead of electrothermal and gas sulfocyanizing parts reduced electricity use by 756,000 kilowatt-hours.

Modernizing the electrode firing furnaces by employing efficient heat insulation and heat recycling made it possible to save 368,000 kilowatt-hours.

Plant efficiency workers are making a major contribution to conserving materials, fuel, and energy. Introduction of 323 efficiency proposals made it possible to save 100 tons of hot rolled metal products, 30 tons of cast steel, three tons of cast iron, and 179,500 kilowatt-hours of electricity.

Efficiency worker L. M. Polovinkin's new container design for transporting parts saved 31 tons of rolled steel. Implementing the suggestion of machine shop

foreman Yu. A. Nikolichev on modification of the technology for drying ZD6 engine jackets made it possible to cut electricity use by 3,600 kilowatt-hours.

Efficiency workers A. V. Petrov, V. P. Vakhnin, A. A. Belov, and D. S. Drozdov are making substantial contributions to the efficient and economical use of material, fuel, and energy at the plant.

The plant collective takes an active part in all-Union inspections of the efficiency of use of raw and processed materials, fuel, and energy. For indicators achieved in the 1980 all-Union inspection, the plant collective was awarded a certificate and monetary prize from the AUCCTU, the Komsomol Central Committee, and USSR Gossnab and its achievements were acknowledged by the Gor'kovskaya Oblast CPSU committee and the board of directors of the Main Territorial Administration of the Volga-Vyatka region.

Despite the successes achieved, there are still unproductive losses of raw and processed materials and energy at the plant. For example, the divisions of material-technical supply and outside cooperation do not insure that materials and equipment are stored in conformity with plans. In addition, not all warehouse areas have crushed stone or other surfaces, and correct storage of materials in the shop is not constantly monitored. Overexpenditures of metal still occur in the manufacture of certain parts, and forged pieces with increased allowances are produced. Expenditure of gasoline for internal transportation has not been organized properly according to norms.

The lack of objective records of materials arriving at the plant leads to significant losses and makes it impossible to conduct a correct analysis and identify the reasons for expenditure of certain materials such as molding sand, clay, and ferromanganese. The delayed installation of railroad scales prevents us from eliminating this serious problem.

Surprise visits by the plant peoples control group and shop patrol posts constantly find cases of wasteful expenditure of energy resources. Despite the great shortage of drinking water and compressed air, leakage is permitted and irrational use of heating, ventilation, and lighting occurs.

The supplementary organizational-technical measures to conserve materials, fuel, and energy in 1981-1982 contemplate a higher level of work to refine the designs of production articles, to introduce progressive industrial processes that provide a decrease in the weight of cast and forged semifinished parts, to cut rolled metal products more efficiently, and to broaden the use of nonmetallic materials and energy-conserving technology.

Launching of the second phase of the crane building shop will solve the problem of establishing a single semifinished part section. Together with improvement in organization of preparatory work this will make it possible to raise the level of use of rolled metal products in crane building significantly.

The plant's master plan of development envisions rebuilding the steam boiler room. Replacement of the obsolete boilers will raise the efficiency of fuel use, while replacement of the obsolete air compressors will greatly lower electricity

consumption. Launching of the main substation with power transmission lines will make it possible to conserve 1.5 million kilowatt-hours of electricity a year.

The collective of the plant faces major challenges in 1982: reduce expenditure norms for rolled ferrous metal products in crane building by 2.3 percent (260,300 tons) and 3.6 percent (80,500 tons) in machine building, and reduce expenditure norms for sheet steel by 2.7 percent, cast iron pieces by 2.5 percent, and pieces forged from ingots by 2.5 percent.

The products list of the plant has not been changed for more than 10 years. Therefore, the first thing that must be done is to review the designs of articles with an eye to reducing their material-intensiveness and eliminating unproductive losses in production. Certain steps must be taken in 1981-1982 to organize weight records of materials coming to the plant and to increase the output of usable cast pieces, which will reduce the expenditure of charge and molding materials.

During the winter energy-supply organizations are instituting restrictions on energy supply by hours of the day and consumption volume for the week and month. Very stiff fines have been established. Therefore, the plant must have a high level of organization and discipline with respect to energy consumption in all shops and services during the winter period.

The statute on bonus payments to plant workers is to be revised to bolster material incentive for work to conserve material resources. A public inspection is to be carried out under the program "The Economy Must Be Economical."

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WAY TO RAISE LABOR PRODUCTIVITY AT SHIP BUILDING YARD DISCUSSED

Moscow RECHNOY TRANSPORT in Russian No 3, Mar 82 pp 29-30

[Article by Yu. Shadrin, Ship Building and Repair Yard imeni III Internatsionala: "Reducing Labor-Intensity in Shipbuilding"]

[Text] The collective of the Ship Building and Repair Yard imeni III Internatsionala successfully fulfilled its assignments in the 10th Five-Year Plan. Technical re-equipping of the yard, the use of more sophisticated technology, and improving production organization helped achieve these positive results.

During the five-year plan the shop received new production and hoisting-transportation equipment. Powerful guillotins, a Kristall TP-2.5 machine for plasma metal cutting, and staple cranes with load capacities of 40 and 80 tons have been introduced. The new equipment made it possible to change over to more progressive technology and manufacture sections and blocks of ship hulls weighing 40 tons. The first phase of reconstruction of the finishing dock has been completed with installation of a crane with a load capacity of 27.5 tons. Work has begun on construction of the second phase of the dock.

The collective coupled a further enlargement of the shipbuilding program with fundamental revision of technology for hull welding based on fully mechanized flow lines to clean the steel, prepare hull parts, and assemble and weld surface sections. The plant is building these lines with its own personnel. But for a number of reasons the pace of work is inadequate, so parallel with accelerating this work it is necessary to find other possibilties of increasing the production of ships. A realistic way to solve this problem would be to streamline shipbuilding technology by switching to simplified forms of hull extremities and modifying the design and technology of welding interbottom compartments.

In practice, however, we must deal with the opposite phenomenon: more complex technology in building sectioned vessels and barges.

In recent years the Ministry of the River Fleet has adopted a policy of designing and building ships figured for operation during their entire depreciation life without replacement of the worn sheet metal of the skin and paneling of the frame, and insuring the possibility of loading them with loose cargo without restrictions on the order of loading operations. Based on these conditions in 1975 the RSFSR River Register published amended rules for building ships which significantly raised the requirements for the thickness of the metal used. As a

result, the designs developed in subsequent years for large sectioned vessels and barges had thicknesses of up to 10-18 millimeters for the skin and frame elements. An example could be the pilot two-section vessel with a load capacity of 9,100 tons built by the plant in 1981 according to design No R156 from the ATsKB [Central Design Bureau]. The specific labor-intensity (worker-hour per tons of load capacity) of building this vessel was 1.55 times greater than the labor-intensity of the pilot vessel design No 1787U (8,900 tons) designed in conformity with the rules of the RSFSR River Register in effect until 1975, and the labor-intensiveness of building the series vessels ratified by the Ministry of the River Fleet was 1.46 times higher.

The yard's lack of appropriate, more powerful mechanized means for preparatory hull work, in particular assembly work, also influenced the increase in labor-intensiveness of building ships from thicker steel. For this reason the volume of manual operations in manufacture of the sections and assembly of the hull in the ways increased and they became more complex.

One of the ways to reduce the labor-intensiveness of shipbuilding is to switch to simplified flat-edged forms for the lines of the ends. The usefulness of such lines is dictated not only by the need to reduce the labor-intensiveness of construction and (this is especially important) reduce heavy manual labor, but also to improve the technological stability for repair. Simplification of the lines does not have a significant impact on the operating characteristics of non-self-propelled vessels when they travel at slow speeds.

An example of such a vessel is the Modul'-1 barge with a load capacity of 2,500-3,000 tons designed by the Vympel Central Design Bureau for Siberian and Far Eastern rivers (see TEKHNOLOGIYA SUDOSTROYENIYA, No 3, 1979).

The questions of reducing labor-intensiveness and metal-intensiveness attracted the attention of specialists during review of the results of acceptance of the pilot sectioned vessel (design No R156) and during ratification of the contract design of the petroleum barge (design No R167), but they were not finally resolved.

It is true that the design of this barge was revised and the ends were modified to a flat-edged design. For design No R156 a resolution of the Scientific-Technical Council of the Ministry of the River Fleet envisions commissioning the Leningrad Institute of Water Transportation to conduct comparative model testing of vessels with the projected hull lines and the modified hull lines in its experimental basin.

For many years the yard has been building ships with double bottoms with the interbottom compartment at a height of 790-890 millimeters and the spacing of the blank framing at 600 millimeters. Frame floors and keelsons divide the interbottom space into compartments that are 1,800 x 2,500 millimeters with a height of 600-630 millimeters in the light space (distance between the blank framing of the second bottom and the bottom).

This design makes it necessary to do hull assembly and welding work in the ways and areas before the ways in the extremely cramped, enclosed compartments of the interbottom space. It is difficult to create safe conditions here, to say nothing of work convenience.

Industry is not yet producing power sources equipped with automatic shut-off devices or devices to lower the idling voltage, so work in the enclosed compartments involves danger, especially during the period of heightened air temperatures.

In addition, because effective ventilation is not possible in the interbottom compartments it is not possible to use automated carbon monoxide welding.

There are two ways to better the working conditions and raise productivity of workers in hull-welding jobs. One of them is to increase the height of the interbottom space to 1,200-1,600 millimeters, which will modify the working conditions of assembly and welding workers and make it possible to use semiautomatic welding, improve ventilation of the interbottom compartments, and simplify the performance of installation-assembly jobs in the ways.

The other way is to discard the enclosed interbottom space in which welding jobs must be done.

Introduction of the program of measures including technical reconstruction of the plant and the use of modern, highly productive mechanized equipment for hull-welding jobs and new technological processes in building ships of simplified design will make it possible to increase the volume of shipbuilding significantly.

Shipbuilding workers expect that the Technical Administration of the Ministry of the River Fleet and the Central Design Bureaus, who are the ship designers, will devote great attention to reducing labor-intensiveness in shipbuilding and to developing designs which allow a significant improvement in working conditions and labor productivity.

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OCEAN AND RIVER

'ORLENOK' CLASS TRAWLER-SEINER

Moscow RYBNOYE KHOZYAYSTVO in Russian No 5, May 82 pp 55-57

[Article by I. B. Varlinskiy and V. A. Tereshchenkov, Giprorybflot (State Institute for the Design and Planning of the Fishery Fleet): "The 'Orlenok' Type Trawler-Seiner"]

[Text] During August to November 1981 a commission from the USSR Ministry of Fishery Management checked out the completed two "Orlenok" type lead ships based on the "Atlantik-333" design at the Volkswerft in Stralsund (GDR) (see cover photo) [photo not included].

The average "Orlenok" trawler-seiner refrigerator ship is a steel-hulled single-propeller vessel with excess freeboard, two continuous decks, a three-story deckhouse, and an aft-located engine room. The ship is designed for the KM [Star] L2A2 class (fishing ship) of the USSR Maritime Registry, and it meets the requirements of the existing international conventions, including the 1977 Torremolinos convention for the safety of fishing ships. The ship has an unlimited cruising range, is designed for fishing by means of bottom and pelagic trawls based on the aft trawling method and purse seine, and it can operate autonomously or as part of an expedition. The ship is provided with a plastic fishing boat (with a 90 HP engine) which also serves as a duty boat.

The ship has facilities for producing beheaded and gutted fish and filets with subsequent freezing and storage in its hold at -28°C, as well as for producing fishmeal, commercial fish oil, and semifinished medicinal oil.

Specifications

Length, m :	
Maximum	62.2
Between perpendiculars	55.0
Beam, m	13.8
Load draught mark, m	5.13
Depth to upper deck, m	9.2
Power of main engines, HP	2x 1200
Full speed at 100% power of main engines, knots	12.9

Sweep winch:	
Traction, kn	2 x 90
Hoisting rate, m/min	87.5
Seiner winch:	
Traction, kn	2x64
Hoisting rate, m/min	60
Capacity of refrigerated hold, m^3	507

The ship is highly energy-equipped and its fishing winches display high tractive characteristics. The use of up-to-date high-capacity mechanisms and equipment and the high level of the mechanization and automation of production processes provide the conditions for a higher labor productivity of crew.

The main propulsion plant consists of a twin second-motion diesel engine unit with power takeoff to DC and AC shaft-generators. The unit includes compact high-speed diesels located in the small engine room. The marine power plant facility includes main and auxiliary engines that represent modifications of the basic VD26/20 engine model, from which they differ only in the number of cylinders. This will serve to improve diesel maintenance and facilitate procurement of spare parts. The second-motion diesel unit was developed at the SKL Combine especially for "Orlenok" type ships.

Operating trials of the 8VD26/20 engines and the diesel twin-engine assembly inclusive of accessories (reducing gear, clutches, power takeoff mechanisms, and control system) were conducted on a mockup stand as well as on the first two lead ships of the series. The torque from the diesel assembly is transmitted to an adjustable-pitch propeller mounted in a rotary fitting. Installed in the aft section of the ship is a steering attachment assuring a tractive effort of up to 26 kn.

The on-board facilities assure the processing of up to 43 tons of fish daily. The capacity of the refrigerating plant is 30 tons daily and that of the fishmeal plant, about 13 tons daily. A facility for the production of fish oil also is available.

The fishing gear is designed for bottom and pelagic trawling and purse seining. There is no provision for on-board storage of the purse seine during trawl fishing. Conversion from one type of fishing to the other should be carried out while the ship is docked.

Trawling is performed aft with the aid of sweep winches and a multiple-drum trawl winch which contains a trawl drum, two spare-trawl cable drums, and six auxiliary drums assuring the continuous drying of the trawl net and the hoisting and discharge of the catch.

Owing to the well-designed layout, the fishing deck is about 18 m long, i.e. nearly as in the earlier-built BMRT class ships.

The purse seining procedure provides for flinging the net from the stern and hoisting it on board. Installed in the bow are pursing davit and a pursing winch with two drums for the pursing rope and a drum for the messenger rope. Two

power-operated pulleys serve to hoist the net and discharge the catch, and in addition there are on-board coils for drying the net as well as a fish pump. The net platform is created by adjusting the slip ramp in the horizontal direction.

The automation of the power plant corresponds to class A2 of the Regulations of the USSR Maritime Registry and assures unmanned servicing of mechanisms and equipment directly in the engine room for 16 hours provided that the central control panel is continuously manned. During the remaining 8 hours current servicing of mechanisms and systems may be performed along with maintenance and repair operations.

The automation of the refrigerating plant assures its unattended operation.

During the inspection trials, the commission offered a number of suggestions and comments as regards improving the technical characteristics of the ship and its operating conditions and accessibility to repair. Their implementation will serve to, e.g. augment hold capacity, reduce the amount of solid ballast, increase the number of single-person cabins, improve the working conditions in the shop, etc. Further refinements will be introduced on the series-produced ships as well as on the first four ships. Some of these will be performed by the shipyard while carrying out the warranty repair of the ships.

During the inspection of the ship, the nomenclature and quantity of spare parts provided with each ship in excess of those required under the Regulations of the USSR Maritime Registry were examined and agreed upon. Part of the set of spare parts, tools, and accessories, which are particularly needed during the shakedown cruise, is provided together with the lead ships.

At first, four lead ships will be built, and series production will commence after a year's operation of these ships. This will make it possible to introduce on the series-built ships the optimal technical solutions as well as to eliminate any shortcomings that may be detected during the first year of operation.

In addition, to optimize the utilization of the period between the reception of the lead ships and the commencement of series-production, it was agreed upon with the management of the shipyard that the first two ships--the "Orlenok" and the "Omul'," will return to the shipyard to eliminate any defects following their first fishing voyage insofar as such defects might impede their subsequent fishing operations.

Considering that "Orlenok"-type ships are equipped with a number of prototype mechanisms and facilities, a specialist from the shipyard has been assigned to provide practical assistance in their use to the crew of the "Orlenok" during its first fishing voyage.

Another special feature of this inspection was that the commission simultaneously inspected two lead ships (the "Orlenok" and the "Omul'"). This made it possible to shorten the overall duration of operating trials, since the purse seining gear was tested on one ship while the trawling gear was tested on the other. In addition,

the parallel inspection and acceptance of two ships served to resolve more flexibly the technical problems arising during the inspection of mechanisms and equipment and apply coordinated solutions to both ships.

Thus, for example, upon discovery of shortcomings in the system for the remote control of the complex diesel assembly--adjustable-pitch propeller, the work to eliminate the defects was divided among two ships: on one ship, sea trials were conducted, and the findings were used to modify on the other ship the design of the pitch-adjusting mechanism of the propeller as well as the scheme of the control system.

Currently the "Orlenok" trawler-seiner refrigerator ship is at sea, engaged in trawl fishing. Operating trials of the validity of the adopted technical solutions are being carried out on this ship, and recommendations and proposals for modifying future series-built sister ships are being worked out. As for the "Omul'," it is now docked in its port of registry (Murmansk) and being fitted out for a purse-seine fishing expedition.

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